

Amendments to the Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An equilibration method for very high resolution, three-dimensional imaging and determination of pulmonary compliance, wherein the method comprises:

delivering and distributing a predetermined volume of hyperpolarized noble gas to [the] conducting airways in each ventilated lung region of [the] a pulmonary system, wherein the lung is inflated and sealed, [~~having an inflated, sealed lung~~] or during a lung-inflating held breath (tidal volume);
measuring distributed volume of local concentrations of the hyperpolarized noble gas in the airways by high resolution, three-dimensional local magnetic resonance imaging, wherein the lung image is segmented using scale-based fuzzy connectedness; and
calculating local pulmonary compliance from said imaged distribution [~~of tidal volume~~].

2. (Original) The method of claim 1, wherein the noble gas is hyperpolarized helium-3 gas (H^3He).

3. (Original) The method of claim 2, further comprising dividing the lung images into as many distinct voxels as imaging resolution permits.

4. (Original) The method of claim 3, further comprising calculating local lung volume by dividing average signal intensity in each voxel by tracheal signal intensity.

5. (Currently Amended) The method of claim 4, further comprising calculating average concentration of H^3He in each voxel by dividing an amount of H^3He in each voxel by volume of the voxel, and calculating amount of H^3He in each [the] voxel by multiplying concentration of H^3He in the gas space of the voxel by volume of gas space in the voxel.

6. (Original) The method of claim 5, further comprising calculating compliance of the voxel by calculating pressure difference between alveolar gas inside the voxel and pleural space outside of the lung, and calculating local compliance in the voxel by dividing the volume of the voxel by transmural pressure gradient (tracheal minus esophageal pressures).

7. (Currently Amended) An equilibration method for very high resolution, three-dimensional imaging and determination of ~~[distribution of]~~ lung functional residual capacity (FRC) ~~[in the lung]~~ using hyperpolarized noble gas, wherein the method comprises:

delivering and distributing a predetermined volume of hyperpolarized noble gas to ~~[the]~~ conducting airways in each ventilated lung region of ~~[the]~~ a pulmonary system; measuring distributed volume of local concentrations of the hyperpolarized noble gas to provide local FRC by high resolution, three-dimensional local magnetic resonance imaging, wherein the lung image is segmented using scale-based fuzzy connectedness; and determining whole lung ~~[volume]~~ FRC based upon summation of the local FRC measurements.

8. (Original) The method of claim 7, wherein the noble gas is hyperpolarized helium-3 gas (H^3He).

9. (Original) The method of claim 8, further comprising dividing the lung images into as many distinct voxels as imaging resolution permits.

10. (Original) The method of claim 9, further comprising, calculating local lung volume by dividing average signal intensity in each voxel by tracheal signal intensity.

11. (Currently Amended) The method of claim 10, further comprising calculating average concentration of H^3He in each voxel by dividing an amount of H^3He in each voxel by volume of the voxel, and calculating amount of H^3He in each ~~[the]~~ voxel by multiplying concentration of H^3He in the gas space of the voxel by volume of gas space in the voxel.

12. (Original) The method of claim 11, further comprising calculating local FRC by dividing signal intensity in the voxel by tracheal signal intensity, and then multiplying by volume of the voxel.

13. (Currently Amended) The method of claim 12, further comprising ~~[measuring whole lung FRC by]~~ summing all local FRC ~~[in]~~ from each voxel to determine whole lung FRC ~~[acquired in accordance with claim 12]~~.

14. (Currently Amended) An equilibration method for very high resolution, three-dimensional imaging and determination of pulmonary compliance and distribution of lung

functional residual capacity (FRC) ~~[in the lung]~~ using hyperpolarized noble gas, wherein the method comprises:

delivering and distributing a predetermined volume of hyperpolarized noble gas to ~~[the]~~ conducting airways in each ventilated region of ~~[the]~~ a pulmonary system, wherein the lung is inflated and sealed, ~~[having an inflated, sealed lung]~~ or during a lung-inflating held breath (tidal volume);

measuring distributed volume of local concentrations of the hyperpolarized noble gas in the airways by high resolution, three-dimensional local magnetic resonance imaging and local FRC, wherein the lung image is segmented using scale-based fuzzy connectedness;

calculating local pulmonary compliance from said measured distribution; ~~[of tidal volume,]~~ and~~;~~

determining whole lung ~~[volume]~~ FRC based upon summation of the local FRC measurements.

15. (Original) The method of claim 14, wherein the noble gas is hyperpolarized helium-3 gas (H^3He).

16. (Original) The method of claim 15, further comprising dividing the lung images into as many distinct voxels as imaging resolution permits.

17. (Original) The method of claim 16, further comprising calculating local lung volume by dividing average signal intensity in each voxel by tracheal signal intensity.

18. (Currently Amended) The method of claim 17, further comprising calculating average concentration of H^3He in each voxel by dividing an amount of H^3He in each voxel by volume of the voxel, and calculating amount of H^3He in each ~~[the]~~ voxel by multiplying concentration of H^3He in the gas space of the voxel by volume of gas space in the voxel.

19. (Original) The method of claim 18, further comprising calculating local FRC by dividing signal intensity in the voxel by tracheal signal intensity, and then multiplying by volume of the voxel.

20. (Original) The method of claim 19, further comprising calculating compliance of the voxel by calculating pressure difference between alveolar gas inside the voxel and pleural space

outside of the lung, and calculating local compliance in the voxel by dividing the volume of the voxel by transmural pressure gradient (tracheal minus esophageal pressures).

21. (Original) The method of claim 15, wherein the method for very high resolution, three-dimensional imaging of pulmonary compliance and distribution of functional residual capacity (FRC) in the lung using H^3He is applied to the pulmonary system of a mammalian subject.

22. (Original) The method of claim 21, wherein the mammalian subject is human.

23. (Original) The method of claim 21, wherein the lung is normal.

24. (Original) The method of claim 21, wherein the lung is injured or diseased.

Claims 25-28 previously cancelled.